

A Review of the Hawaiian Hydrophilidae (Coleoptera)¹

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ABSTRACT: The species of Hydrophilidae occurring in the Hawaiian Islands are reviewed, with all genera and species keyed and briefly diagnosed. Six adventive species are reported for the first time from Hawaii: *Coelostoma segne* Balfour-Browne, *Coelofletium exstriatum* (Orchymont), *Noteropagus obliquus* Orchymont, *Cercyon laminatus* Sharp, *Paroosternum horni* (Orchymont), and *Oosternum costatum* Sharp. Of the 21 hydrophilids now known from the Islands, two are endemic, one is certainly indigenous, three are possibly indigenous, four are purposely introduced, and 11 are adventive.

THE HYDROPHILIDAE (sensu Hansen 1991) are rather poorly represented in Hawai'i. Currently, the total number of species is 21, comprising two that are certainly endemic, one certainly indigenous, three possibly indigenous, four purposely introduced, and 11 adventive.

Eschscholtz (1822) described the first hydrophilid from the Islands, the endemic *Hydrophilus semicylindricus* (now in *Limnoxenus*), followed by Sharp (1879, 1908), who added five more species, including the indigenous *Omicrus brevipennis* (originally thought to be endemic) and the second endemic, *Hydrobius nesiticus* (now in *Limnoxenus*). At least four species were purposely introduced to Hawai'i as possible enemies of agricultural pests (Swezey 1931). Fullaway (1921) and Williams (1932) recorded more adventive species. Checklists of the hydrophilids of the Pacific region were given by Orchymont (1937a) and Balfour-Browne (1945); both listed a total of nine Hawaiian species but omitted the purposely introduced species and some of the adventive species. Additional adventive species were recorded by Pemberton (1945), Zimmerman (1949), and Beardsley (1981). The Hawaiian checklist edited by Nishida (1992) reported 15 species.

During a stay in Honolulu in June 1991, I had the opportunity to study the collections

at the Bishop Museum (BPBM) and the University of Hawai'i (UH) and to do some fieldwork in the neighborhood of Honolulu. It turns out that a few hydrophilids had been misidentified, and they, together with new collections, are here reported as new to Hawai'i. They are *Coelostoma segne* Balfour-Browne, *Coelofletium exstriatum* (Orchymont), *Noteropagus obliquus* Orchymont, *Cercyon laminatus* Sharp, *Paroosternum horni* (Orchymont), and *Oosternum costatum* Sharp. In the species treatments that follow, they are marked with an asterisk (*), as are new island records of previously known species. A double asterisk (**) identifies a name new to Hawai'i for a previously known but misidentified species.

This study has been based mainly on material from the above-mentioned sources, the Zoological Museum in Copenhagen (ZMUC), and my own collection (MH).

Faunal Composition

The Hawaiian fauna has been influenced to a large extent by the activity of humans. The truly endemic and indigenous elements (mentioned above) make up only a small part of the Hawaiian fauna. The three possibly indigenous species, *Coelostoma fabricii* (Montrouzier), *Dactylosternum subquadratum* (Fairmaire), and *Cryptopleurum evansi* Balfour-Browne are more or less widely distributed in the Pacific, and it is not evident that they were actually introduced to Hawai'i

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by humans, nor that their occurrence in Hawai'i is more recent than elsewhere in the Pacific. It is possible that they arrived on many Pacific islands with drifting organic debris. Of the purposely introduced species, *Cercyon quisquilius* (L.) and *Sphaeridium scarabaeoides* (L.) are from Europe and *Dactylosternum dytiscoides* (F.) and *D. hydrophiloides* (MacLeay) are from the Philippines. An additional species, *Dactylosternum cycloides* Knisch, was reported as introduced to Hawai'i, but this is probably an error.

The remaining hydrophilids, all adventive, originate from various regions: three are

North American, one is widespread from the southern United States to northern South America, one is Central American, one is from the East Palearctic, one is East Palearctic-Oriental, two are Oriental, one is West African, and one is cosmopolitan but probably of Neotropical origin.

In the Hydrophilidae, it is primarily the terrestrial forms (subfamily Sphaeridiinae) that become introduced to new areas. Nearly all the Hawaiian adventives fit this scheme, except the three North American ones. All of these latter species are in the Hydrophilinae and are aquatic.

KEY TO HAWAIIAN GENERA OF HYDROPHILIDAE

1. First segment of middle and posterior tarsi much shorter than second (Figure 4). Antennal club loosely segmented. Aquatic forms (Hydrophilinae). Length 3–11 mm 2
1. First segment of middle and posterior tarsi at least as long as second (Figure 5). Antennal club often rather compact. Terrestrial forms (except *Coelostoma*) (Sphaeridiinae). Length 1.2–8 mm. 4
- 2(1). Smaller species, length 3–4.1 mm. Pronotum and elytra almost uniformly yellowish or reddish brown. Last segment of maxillary palpi bending outward, shorter than penultimate (Figure 2) *Enochrus*
2. Larger species, length 7.5–11 mm. Pronotum and elytra black with more or less distinct metallic hue, lateral margins sometimes yellow. Last segment of maxillary palpi bending inward, longer than penultimate (Figure 3) 3
- 3(2). Elytra with 10 regular series of punctures. Elevated portions of meso- and metasternum not continuous, the latter not projecting backward into a long spine (Figure 6) *Limnoxenus*
3. Elytra without such series of punctures. Elevated portions of meso- and metasternum continuous, forming a common sternal keel that is produced backward into a long horizontal spine (Figure 7) *Tropisternus*
- 4(1). Head not abruptly narrowed or excised in front of eyes, antennal bases concealed under a lateral shelf (Figures 14–16). Length 3.2–8 mm. 5
4. Head abruptly narrowed or excised in front of eyes, so the antennal bases are exposed (Figures 12, 13, 17). Length 1.2–4 mm. 8
- 5(4). Antennal club loosely segmented (Figure 15). Anterior margin of eyes hardly emarginate in lateral view (Figure 14). Dorsal face black, seldom with paler elytral apex 6
5. Antennal club compact (as Figure 12). Anterior margin of eyes rather strongly emarginate in lateral view (Figure 16) or, if not, then head and pronotum red 7
- 6(5). Elytra with sharply impressed sutural stria in posterior half or more. *Coelostoma*
6. Elytra without any trace of striae. *Coelofletium*
- 7(5). Elytra with 10 regular striae or series of punctures, uniformly piceous or black. Tibiae with rather small spines (Figure 5) *Dactylosternum*
7. Elytra without distinct striae or series of punctures, except for sutural stria, with

- conspicuous yellow or reddish markings. Tibiae with very long and rigid spines (Figure 23) *Sphaeridium*
- 8(4). Clypeus strongly deflexed and convex in lateral view, with angulate, strongly deflexed anterolateral extensions (Figures 12, 13, 17). Labrum rather large, not retracted under clypeus 9
8. Clypeus not deflexed and rather weakly convex in lateral view (as Figures 14, 16), without angulate and deflexed anterolateral extensions. Labrum retracted under clypeus and usually completely concealed in dorsal view 10
- 9(8). Anterolateral deflexed portions of clypeus not sharply demarcated from the remainder of clypeus (Figure 13). Elevated portion of mesosternum convex, tectiform, sloping down laterally *Omicrus*
9. Anterolateral deflexed portions of clypeus defined from the remainder of clypeus by a fine ridge (Figure 12). Elevated portion of mesosternum forming a flat transverse pentagonal tablet *Noteropagus*
- 10(8). Prosteronum with very large and deep antennal grooves attaining lateral prothoracic margin, the latter angulate in lateral view. Elevated portion of mesosternum forming a large transverse pentagonal tablet *Cryptopleurum*
10. Prosteronum with smaller antennal grooves not attaining lateral prothoracic margin, the latter not angulate in lateral view. Elevated portion of mesosternum forming an elongate oval tablet or a median longitudinal carina 11
- 11(10). Prosteronum simply tectiform with mesal portion not demarcated from the antennal grooves. Length 2.0–4.0 mm *Cercyon*
11. Prosteronum with mesal portion elevated and sharply demarcated from the antennal grooves. Smaller, 1.2–1.5 mm 12
- 12(11). Mesal portion of prosteronum deeply excised laterally by the antennal grooves (Figure 11). Metasternum with sharply defined femoral lines attaining anterior corners of metasternum, without anterolateral arcuate ridge (Figure 9) *Paroosternum*
12. Mesal portion of prosteronum not excised laterally by the antennal grooves, the sides at most slightly concave (Figure 10). Metasternum with femoral lines abbreviated anteriorly, and with anterolateral arcuate ridge corresponding to the arc described by the tip of the posterior femora (Figure 8) *Oosternum*

Genus *Enochrus* Thomson

Enochrus Thomson, 1859:18. Type species: *Hydrophilus bicolor* sensu Paykull (nec Fabricius) (= *Hydrophilus melanocephalus* Olivier) (orig. des.).

Rather small (Hawaiian sp. ca. 3–4.1 mm), oval, moderately convex. Dorsal face glabrous. Labrum well sclerotized, not retractable under clypeus. Maxillary palpi long, apical segment shorter than penultimate (in Hawaiian sp.), bending outward so palpi fold up in a characteristic Z-shaped manner. Antennae nine-segmented, club loosely segmented. Elytra with sutural stria posteriorly, otherwise without striae or series of punctures (in Hawaiian sp.). Prosteronum somewhat bulging or finely carinate medially, without antennal grooves. Mesosternum raised me-

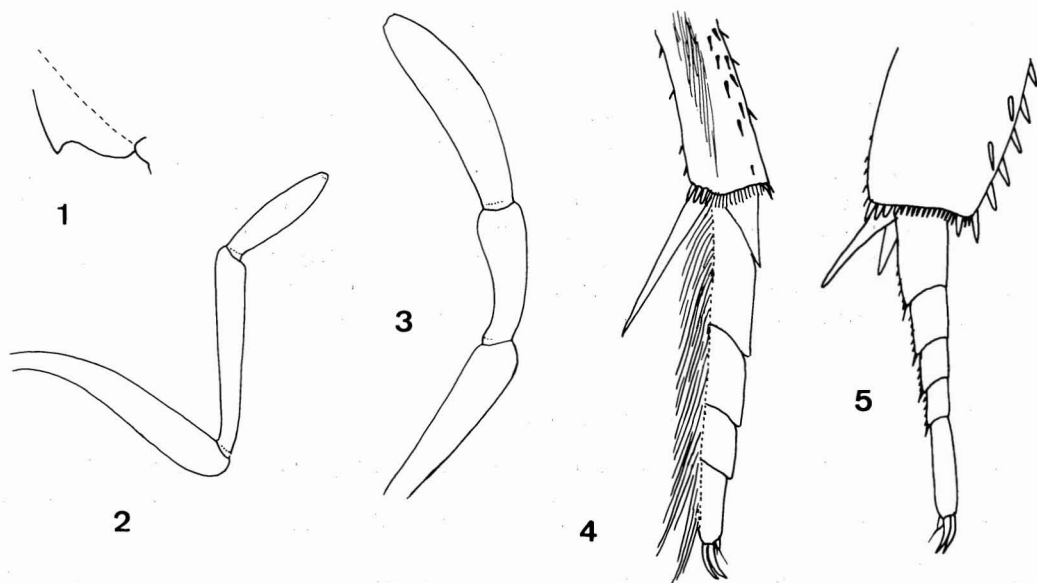
dially to a sharp keel. Metasternum with large, broad, somewhat convex middle portion, not keeled. Basal ventrite not carinate. Middle and posterior femora with hydrofuge pubescence except on small apical portion. Middle and posterior tarsi without swimming hairs, their first segment much shorter than second.

***Enochrus sayi* Gundersen
Figures 1, 2

Enochrus sayi Gundersen, 1977:262 (type locality: U.S.A., Florida, Okeechobee).

Enochrus nebulosus: Williams, 1932:16; 1936:268 (nec Say, 1824).

Enochrus (Lumetus) pygmaeus: Orchymont, 1937a:149, 151. Balfour-Browne, 1945:111, 118 (nec Fabricius, 1792).



FIGURES 1-5. 1, *Enochrus sayi*, mesosternal elevation, lateral view; 2, same, right maxillary palpus; 3, *Limnoxenus semicylindricus*, right maxillary palpus; 4, *Tropisternus lateralis humeralis*, right hind tarsus; 5, *Dactylosternum hydrophiloides*, right hind tarsus.

MATERIAL EXAMINED: O'AHU: Barbers Point, V.1950 (1, BPBM); Barbers Point, VIII.1950 (1, BPBM); Barbers Point, IX.1950 (1, BPBM); Barbers Point, IV.1952 (1, BPBM); 'Ewa, V.1956 (1, BPBM); 'Ewa, IX.1957 (2, BPBM); 'Ewa, 10.XII.1965 (2, UH); Hale'iwa, 12.IV.1931 (2, UH); HAFB [Hickham Air Force Base], Ag. Office, 16.IV.1980 (2, MH); Hickham Field, 14.IV.1945 (1, UH); Honolulu, 18.II.1952 (4, UH); Honolulu (1, BPBM); Kāne'ohe, IX.1954 (9, BPBM); Kawainui Marsh, 30.I.1982 (1, BPBM); Maunaloa, 19.IV.1937 (31, BPBM); Mt. Tantalus (1, BPBM); Salt Lake, 7.VI.1973 (1, BPBM); U.H. Farm (1, UH).

DIAGNOSIS: Length 3-4.1 mm. Yellowish to yellowish brown, head black, clypeus yellowish or variably darkened in middle; ventral face piceous to black, with prosternum, lateral portions of prothorax, and elevated portions of meso- and metasternum more or less paler; maxillary palpi and antennae yellow, the latter with slightly darker club, legs yellowish red, pubescent portion of femora brownish. Mesosternal carina well developed,

its lower margin sinuate in lateral view, produced into a small acute spine anteriorly (Figure 1). Fifth ventrite with small, rather shallow apical emargination.

BIONOMICS: Aquatic; some specimens were labeled from "shallow pool." Sometimes collected at light.

DISTRIBUTION: O'ahu. Nearctic: eastern North America.

DISCUSSION: Accidentally introduced from North America; now established. Previous Hawaiian records were misidentifications of *E. pygmaeus* (F.) or *E. nebulosus* (Say) (= *pygmaeus* ssp. *nebulosus*). The species is distinguished by a differently shaped mesosternal lamella and has been confused with *E. pygmaeus* ssp. *nebulosus* throughout its range (cf. Gundersen 1977).

Genus *Limnoxenus* Motschulsky

Limnoxenus Motschulsky, 1853: 10. Type species: *Hydrophilus oblongus* Herbst (= *Hydrophilus niger* Gmelin) (monotypy).

Rather large (Hawaiian spp. ca. 7.5–11 mm), oval, moderately convex. Dorsal face glabrous. Labrum well sclerotized, not retractable under clypeus. Maxillary palpi rather long, apical segment longer than penultimate, bending inward. Antennae nine-segmented, club loosely segmented. Elytra with 10 regular series of punctures, first series forming sutural stria posteriorly, the remaining series sometimes also striiform. Prosternum tectiform, carinate medially, without antennal

grooves. Mesosternum raised medially to a rather sharp keel (rather small and with rounded, not straight, lower margin in Hawaiian spp.). Metasternum with rather convex middle portion, somewhat ridged medially, terminating in a short tooth posteriorly. Basal ventrite not carinate. Middle and posterior femora with small hydrofuge pubescent area basally. Middle and posterior tarsi with fringe of long swimming hairs, their first segment much shorter than second.

KEY TO HAWAIIAN SPECIES OF *Limnoxenus*

1. Serial punctures of elytra not forming distinct striae (except posterior sutural stria)..... *semicylindricus*
1. Serial punctures of elytra forming well-defined, impressed striae..... *nesiticus*

Limnoxenus semicylindricus (Eschscholtz)

Figures 3, 6

Hydrophilus semicylindricus Eschscholtz, 1822:42. Sharp, 1879:82 (type locality: U.S.A., Hawai'i, O'ahu ["Sandwichinseln, Wahu"]).

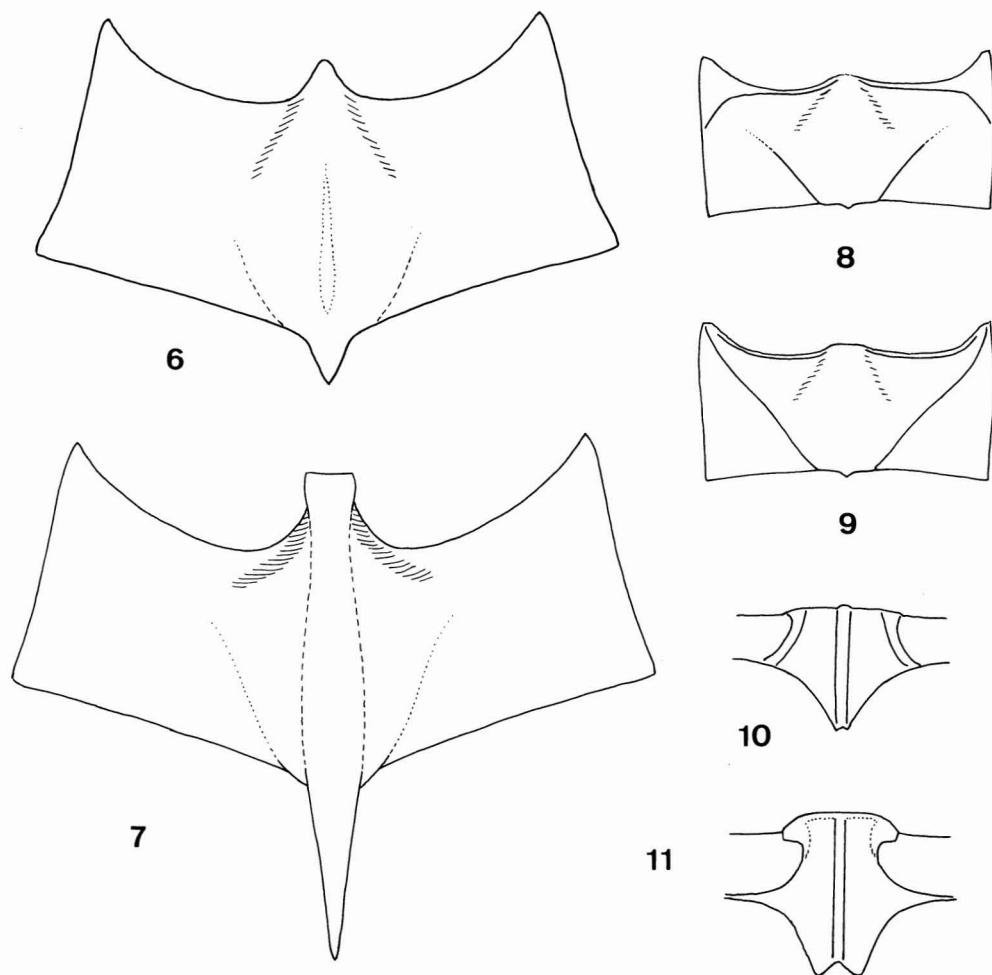
Hydrobius semicylindricus: Blackburn & Sharp, 1885:218, 276. Sharp, 1908:578.

Limnoxenus semicylindricus: Orchymont, 1937a:149, 151. Balfour-Browne, 1945: 110, 117.

MATERIAL EXAMINED: KAUA'I: T.H., 9.IX.1919 (6, BPBM). O'AHU: Hale'au'au stream, 9.I.1930 (1, UH); Honolulu Mts., 2000 ft, 1896 (2, BPBM); Kawailoa, IV.1893 (2, BPBM); Koko Head, 7.II.1951 (10, BPBM); Kukuiala Val., 10.IX.1934 (1, BPBM); Lanihuli R., 9.III.1916 (4, BPBM); Mt. Tantalus, 10.III.1936 (5, BPBM); Mt. Tantalus, 23.I.1958 (10, UH); Niu Val., 11.XI.1906 (2, UH); North Hālawā Valley, 11.VI.1991 (1, MH); North Hālawā Valley, 12.VI.1991 (1, MH); Nu'uānu Val. (4, ZMUC); Nu'uānu Pali, 28.VI.1917 (2, BPBM); Pālolo, 24.VIII.1906 (2, UH); Poamoho Trail, 9.III.1961 (6, BPBM); Punalu'u, 1000 ft, 10.VI.1923 (1, BPBM); Punalu'u, VIII.1961 (5, BPBM); Punalu'u Val., Castle Trail, 1000 ft, VI.1973 (1, BPBM); Pu'u Kānehoa, X.1958 (4, BPBM); Sacred Falls, VI.1953 (2, UH); S.E. Ko'olau Mts Slope,

1917 (2, BPBM); Wai'alae Iki, 3.VIII.1917 (2, BPBM); Wai'alae Iki, IX.1920 (2, UH); Wai'anae, VIII.1961 (1, BPBM); Wai'anae Mts, IV.1892 (1, BPBM); Wai'anae Mts, Mokulē'ia For. Res., Pahole Gulch, 550 m, 31.XII.1973 (2, BPBM). MOLOKA'I: Kainalu, 24.VII.1927 (1, BPBM); Puna'ula, 28.XII.1932 (3, BPBM); Upper Kawela Gulch, 1100 m, 5.I.1981 (6, BPBM). MAUI: Haipua'ena, 30.VI.1920 (1, BPBM); Honomanū, 30.VI.1920 (1, BPBM); 'Īao Valley, 7.XII.1920 (1, UH); Nāhiku, 20.VIII.1929 (1, BPBM); Waiho'i Valley (E. Maui), 600–700 m, 18.VIII.1972 (6, BPBM); Waiho'i Valley (E. Maui), 914 m, 20.III.1974 (1, BPBM). HAWAI'I: Kohala For. Res., Alakahi Stream, 3880 ft, 14.XI.1975 (3, BPBM); Pu'u La'alā'au, Kohala Mts, 4000 ft, 30.VIII.1966 (12, UH); Upper Hāmākua Ditch Trail, 8.III.1929 (1, UH). "Sandwich Isl." (2, ZMUC).

DIAGNOSIS: Length 7.5–10 mm. Black, dorsal face with faint metallic hue; maxillary palpi and antennae reddish, the latter with darker club, legs piceous to almost black, tarsi usually a little paler. Serial punctures of elytra not or hardly forming striae, except for a posterior sutural stria, serial punctures rather fine and moderately dense, distance between punctures generally a little larger than diameter of punctures; elytral inter-



FIGURES 6-11. 6, *Limnoxenus semicylindricus*, metasternum; 7, *Tropisternus lateralis humeralis*, metasternum; 8, *Oosternum costatum*, metasternum; 9, *Paroosternum horni*, metasternum; 10, *Oosternum costatum*, mesal portion of prosternum; 11, *Paroosternum horni*, mesal portion of prosternum.

stices flat or almost so, with very fine, rather sparse punctation and rows of coarse setiferous punctures in interstices 3, 5, 7, and 9.

BIONOMICS: Aquatic; occurring in both running and stagnant fresh water.

DISTRIBUTION: Kaua'i, O'ahu, Moloka'i, Lāna'i (Blackburn and Sharp 1885), Maui, Hawai'i. Endemic.

DISCUSSION: This endemic Hawaiian species was once common throughout its range

and occurred at various altitudes (Blackburn & Sharp 1885, Sharp 1908). Now, it has become rarer and more or less restricted to higher elevations.

Limnoxenus nesiticus (Sharp)

Hydrobius nesiticus Sharp, 1908:578 (type locality: U.S.A., Hawai'i, O'ahu [Kawai-loa Gulch]).

Limnoxenus nesiticus: Orchymont, 1937a: 149, 151. Balfour-Browne, 1945:110, 117.

MATERIAL EXAMINED: O'AHU: Kawailoa Gulch, far up, IV.1893 (Fauna Hawaiiensis collection) (1, BPBM).

DIAGNOSIS: Length 11 mm. Color as in *L. semicylindricus*. Serial punctures of elytra forming well-impressed striae, their punctures rather coarse and denser than in *L. semicylindricus*, distance between punctures generally about or hardly as large as diameter of punctures; elytral interstices a little convex, almost impunctate except for rows of coarse setiferous punctures in interstices 3, 5, 7, and 9.

BIONOMICS: Nothing is published on the habits of this species, but the well-developed swimming hairs on the tarsi leave no doubt that it is aquatic (like other species of the genus).

DISTRIBUTION: O'ahu (apparently only known from the type series: Kawailoa Gulch). Endemic.

DISCUSSION: This species, one of the two endemic Hawaiian hydrophilids, has apparently not been seen since the type series was collected 100 yr ago. Possibly now extinct.

Genus *Tropisternus* Solier

Tropisternus Solier, 1834:302. Type species: *Hydrophilus lateralis* Fabricius (des.: Brullé, 1835).

Rather large (Hawaiian spp. 8–9.5 mm), oval, moderately convex. Dorsal face glabrous. Labrum well sclerotized, not retractable under clypeus. Maxillary palpi rather long, apical segment longer than penultimate, bending inward. Antennae nine-segmented, club loosely segmented. Elytra without striae or series of punctures (except for a few distant rows of coarser setiferous punctures). Prosternum strongly raised medially to a hoodlike process that is deeply sulcate from behind to receive anterior apex of mesosternal keel, without antennal grooves. Mesosternum raised medially to a high large keel with lower margin horizontal and flattened. Metasternum with blunt glabrous median keel fused with mesosternal keel and terminating in a long, rigid, horizontal spine posteriorly. Basal ventrite not carinate. Middle and posterior femora with small hydrofuge pubescent area basally. Middle and posterior tarsi with fringe of long swimming hairs, their first segment much shorter than second.

KEY TO HAWAIIAN SPECIES OF *Tropisternus*

1. Pronotum and elytra uniformly black, with weak metallic hue..... *salsamentus*
1. Pronotum and elytra with lateral margins broadly yellow..... *lateralis humeralis*

Tropisternus salsamentus Fall

Tropisternus salsamentus Fall, 1901:214. Beardsley, 1981:325 (type locality: U.S.A., California, Redondo).

MATERIAL EXAMINED: O'AHU: 'Āina Haina, 21.III.1979 (1, BPBM); Airport, 5.II.1970 (5, UH); 'Ewa, V.1978 (2, UH); HAFB [Hickham Air Force Base], Ag. Office, 16.IV.1980 (1, MH); Kāne'ohe, 30.XI.1973 (3, UH); Pearl City, 5.II.1970 (1, UH); Salt Lake, 10.IV.1972 (1, UH). MAUI: Hana'ula (W. Maui), 4000 ft, 9.VII.1968 (14, UH). HAWAII: Hilo, Waiākea, 23.VII.1975 (1, UH).

DIAGNOSIS: Length 8.5–9.5 mm. Black, dorsal face with faint metallic hue; sternal keel slightly paler; maxillary palpi yellowish red, antennae yellow with slightly darker club, legs yellowish red with slightly darker tarsi, basal pubescent portion of femora blackish.

BIONOMICS: Aquatic; specimens are labeled "stagnant water." Sometimes collected at light.

DISTRIBUTION: O'ahu, Maui, Hawai'i*. Nearctic: California.

DISCUSSION: Accidentally introduced from North America; now established on several Hawaiian Islands.

***Tropisternus lateralis humeralis*
Motschulsky
Figures, 4, 7

Tropisternus humeralis Motschulsky, 1859:
176 (type locality: U.S.A., California).

Tropisternus lateralis ssp. *humeralis*: Miller,
1965: 50.

Tropisternus lateralis var. *dorsalis*: Zimmer-
man, 1949: 341 (nec Brullé, 1841).

Tropisternus lateralis binotatus: Nishida,
1992: 66 (nec Walker, 1866).

MATERIAL EXAMINED: O'AHU: Barbers
Point, 1.XI.1980 (2, BPBM); 'Ewa, 23.IV.1950
(6, UH); Honolulu, 15.X.1950 (1, UH); Hono-
lulu, III.1956 (1, BPBM); Nu'uauu Val., 29.VI.
1948 (9, UH); Kailua, 29.XI.1961 (8, UH);
Kāne'ohe, 16.V.1950 (1, UH); Kunia, 16.VI.
1982 (1, MH); Kunia, 1.VIII.1986 (1, UH);
Salt Lake, 1970 (2, UH); Salt Lake, 10.XI.
1973 (1, UH); Waia'nae, III.1950 (1, BPBM);
Wai'anae, 11.XI.1950 (1, UH).

DIAGNOSIS: Length 8–9.5 mm. Black,
dorsal face with faint metallic hue, anterior
portion of clypeus and lateral portions of
pronotum and elytra sharply defined yellow;
lateral portions of prothorax also yellowish
ventrally, sternal keel reddish; maxillary palpi
and antennae yellowish red, the latter with
darker club, legs reddish, basal pubescent
portion of femora blackish.

BIONOMICS: Aquatic, apparently frequent-
ing a wide range of aquatic habitats (Sme-
tana 1988); some Hawaiian specimens are
labeled "fresh water pond" or "irrigation
ditch." Sometimes collected at light.

DISTRIBUTION: Kaua'i (Nishida 1992),
O'ahu. Nearctic: Pacific coast of North

America from Baja California to southern
British Columbia.

DISCUSSION: Accidentally introduced from
North America; now established at least on
O'ahu. *T. lateralis* (Fabricius) is a variable
species currently divided into a number of
subspecies. The Hawaiian specimens were
first recorded as ssp. *dorsalis* Brullé (= *limba-
tus* Brullé), later as ssp. *binotatus* Walker
(= *marginatus* Motschulsky [cf. Smetana
1988]), but should rather be considered as
ssp. *humeralis* (see, e.g., Smetana [1988] for
separation of North American subspecies of
T. lateralis).

Genus *Coelostoma* Brullé

Coelostoma Brullé, 1835: 293. Type species:
Hydrophilus orbicularis Fabricius (mono-
typy).

Moderate sized (Hawaiian spp. 4–6.5 mm),
broadly oval, rather strongly convex. Dorsal
face glabrous. Labrum relatively soft and pale,
partly retracted under clypeus. Maxillary palpi
rather short, apical segment slightly longer
than penultimate, bending inward. Antennae
nine-segmented, club loosely segmented. Ely-
tra with sutural stria in about posterior half,
otherwise without striae or series of punc-
tures. Prosternum slightly bulging medially,
without antennal grooves. Mesosternum
raised medially to an arrowhead-shaped,
somewhat convex process. Metasternum with
raised and rather convex middle portion,
which strongly projects anteriorly where it
closely abuts mesosternal elevation. Basal
ventrite not carinate (in Hawaiian spp.).
Middle and posterior femora without hydro-
fuge pubescence (in Hawaiian spp.). Middle
and posterior tarsi without swimming hairs,
their first segment somewhat longer than
second.

KEY TO HAWAIIAN SPECIES OF *Coelostoma*

- 1. Larger, 5.5–6.5 mm. Elytra entirely black *fabricii*
- 1. Smaller, 4.0–4.7 mm. Elytra black with posterior quarter yellowish red *segne*

Coelostoma fabricii (Montrouzier)

Figures 14, 15

Ochthebius fabricii Montrouzier, 1860:245 (type locality: New Caledonia).*Coelostoma fabriciusi*: Orchymont, 1937a: 149, 150 (unjust. emend.).*Coelostoma fabricii*: Williams, 1936:272. Balfour-Browne, 1945:109, 116.*Cyclonotum extraneum* Sharp, 1908:579 (type locality: U.S.A., Hawai'i, O'ahu (+Kaua'i?). Orchymont, 1924:30.

MATERIAL EXAMINED: KAUA'I: Kapa'a, II.1919 (1, UH); Kaua'i, 1897 ("Cyclonotum extraneum Ind.typ. D.S., Perkins") (1, BPBM). O'AHU: Barbers Point, VIII.1949 (2, BPBM); Barbers Point, VI.1953 (1, BPBM); Barbers Point, IX.1958 (1, BPBM); 'Ewa, 27.IX.1953 (1, UH); 'Ewa, 28.V.-4.VI.1965 (1, UH); Hale'iwa, 6.III.1956 (1, BPBM); HAFB [Hickham Air Force Base], Ag. Office, 16.IV.1980 (1, MH); Honolulu, 2.VI.1921 (1, BPBM); Honolulu, III.1955 (1, UH); Honolulu, 26.II.1964 (1, UH); Honolulu, 20.VI.1991 (1, MH); Honolulu (2, BPBM); Kailua, 4.VI.1959 (1, UH); Kailua, X.1977 (1, UH); Kaimukī, 1923 (2, BPBM); Kalihi, I.1923 (1, BPBM); Kāne'ohe, IX.1954 (1, BPBM); Kāne'ohe, 5.II.1968 (1, BPBM); Kewalo, 5.IV.1914 (1, UH); Kunia, 20-26.II.1968 (1, BPBM); Mānoa, 23.IV.1922 (2, BPBM); O'ahu, VIII.1914 (2, BPBM); Salt Lake, XI.1953 (5, BPBM); Salt Lake, 7.VI.1973 (1, BPBM); T.H., I.1916 (1, UH); Wahiawā, IX.1953 (1, BPBM); Waimānalo, 30.IX.1904 (1, UH). MAUI: Kaupō, 2.II.1937 (8, BPBM); Maui, 19.III.1919 (1, BPBM); Maui, 19.IX.1919 (1, UH). HAWAI'I: Hilo, 26.II.1961 (1, UH); Hilo, Waiākea, 23.VII.1975 (1, UH); Mountain View, 1600 ft, VII.1936 (1, UH); Waimanu Val., 11.VIII.1986 (1, BPBM).

DIAGNOSIS: Length 5.5-6.5 mm. Black; maxillary palpi and antennae yellowish red, the latter with darker club, legs piceous with paler tarsi.

BIONOMICS: Aquatic, probably mainly in stagnant water; some Hawaiian specimens are labeled "emergent vegetation." Sometimes collected at light.

DISTRIBUTION: Ni'ihau (Nishida 1992), Kaua'i, O'ahu, Maui*, Hawai'i*. Indo-Pacific and Australia: Sumatra and eastern Australia to New Caledonia and Vanuatu.

DISCUSSION: Probably indigenous to the Hawaiian Islands (although listed as adventive by Nishida 1992).

**Coelostoma segne* Balfour-Browne

Coelostoma segne Balfour-Browne, 1952:127 (type locality: Benin [Dahomey], Zagnanado).

MATERIAL EXAMINED: O'AHU: S.E. Ko'olau Mts, 1916 (1 ♂, BPBM).

DIAGNOSIS: Length 4-4.7 mm. Black, pronotum with narrowly and slightly paler margins, apical quarter of elytra yellowish red; maxillary palpi and antennae yellow, the latter with darker club, legs reddish piceous with paler tarsi.

BIONOMICS: Nothing is known about the habits of this species; it is probably aquatic.

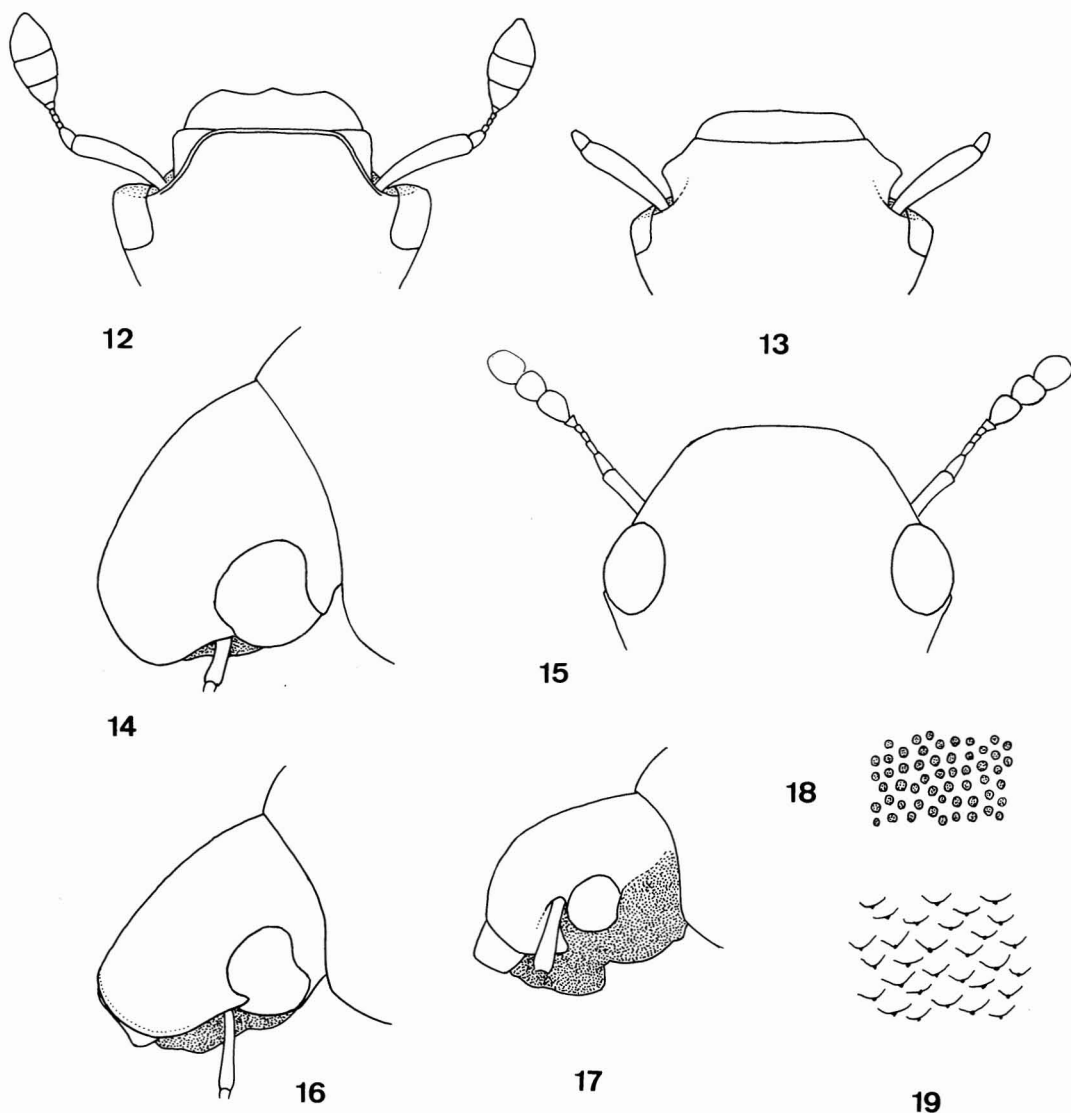
DISTRIBUTION: O'ahu (Ko'olau Mts, only a single specimen). Afrotropical: Benin and Togo.

DISCUSSION: Accidentally introduced from Africa, but probably not established on the Hawaiian Islands. I have not seen the type of this species, but the reddish elytral apex in combination with the configuration of the male genitalia leaves little doubt about the identity of the Hawaiian species.

Genus *Coelofletium* Orchymont

Coelofletium Orchymont, 1925a: 200 (as *Dactylosternum* subgen.); 1937b: 134 (as valid gen.). Type species: *Dactylosternum extriatum* Orchymont (monotypy).

Moderate sized (Hawaiian sp. 4.2-5 mm), broadly oval, strongly convex. Dorsal face glabrous. Labrum relatively soft and pale, partly retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club loosely seg-



FIGURES 12-19. 12, *Noteropagus obliquus*, head, anterodorsal view; 13, *Omicrus brevipes*, head, anterodorsal view; 14, *Coelostoma fabricii*, head, lateral view; 15, same, head, dorsal view; 16, *Dactylosternum hydrophiloides*, head, lateral view; 17, *Omicrus brevipes*, head, lateral view; 18, *Dactylosternum abdominale*, pronotal punctation; 19, *D. subquadratum*, pronotal punctation.

mented. Elytra without striae or series of punctures. Prosternum tectiform, finely carinate medially, without antennal grooves. Mesosternum raised medially to a somewhat arrowhead-shaped, somewhat convex process. Metasternum with raised, rather convex, and (in Hawaiian sp.) rather narrow

middle portion, which strongly projects anteriorly where it closely abuts mesosternal elevation. Basal ventrite not carinate. Middle and posterior femora without hydrofuge pubescence (in Hawaiian sp.). Middle and posterior tarsi without swimming hairs, their first segment a little longer than second.

**Coelofletium exstriatum* (Orchymont)

Dactylosternum (*Coelofletium*) *exstriatum* Orchymont, 1925a:201 (type locality: Philippines, Luzon [Mt. Banahao + Manila]).

Coelofletium exstriatum: Orchymont, 1937b: 134.

MATERIAL EXAMINED. O'AHU: Honolulu, Woodlawn, 15.VI.1991 (1, MH); Paradise Park nr Mānoa Falls, 21.VI.1991 (2, MH).

DIAGNOSIS: Length 4.2–5 mm. Black; ventral face reddish piceous; maxillary palpi and antennae yellowish red, legs reddish piceous. Dorsal face shining, extremely finely punctate.

BIONOMICS: Terrestrial; Hawaiian specimens were collected in wet, decaying banana stem and compost (garden refuse). Probably occurring in many kinds of decaying organic plant debris.

DISTRIBUTION: O'ahu. Oriental: the Philippines, but probably more widespread.

DISCUSSION: Probably accidentally introduced, and now established. It is possible, however, that the species was one of several species purposely introduced from the Philippines in 1925–1926 as biological pest control agents (see also under *Dactylosternum*). Although I have not seen the type of this species, there is no doubt about its identity. The Hawaiian specimens have been compared with a specimen from the Philippines (collected near the type localities). All specimens are identical, externally as well as male genitalia, and agree perfectly with a very detailed description of the species given by Orchymont (1926).

Genus *Dactylosternum* Wollaston

Dactylosternum Wollaston, 1854:99. Type species: *Dactylosternum rousseti* Wollas-

ton (= *Sphaeridium abdominale* Fabricius) (monotypy).

Rather small to rather large (Hawaiian spp. 3.2–8 mm), oval to broadly oval, often somewhat parallel-sided, moderately or rather strongly (*subquadratum*) convex. Dorsal face glabrous. Labrum relatively soft and pale, at least partly retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with 10 striae or series of punctures. Prosternum tectiform, more or less carinate medially, without antennal grooves. Mesosternum raised medially to a somewhat arrowhead-shaped, somewhat convex process. Metasternum with raised, rather convex middle portion, which strongly projects anteriorly where it closely abuts mesosternal elevation. Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment more or less longer than second.

I have not included *D. cycloides* Knisch, 1921, although, according to Swezey (1931: 376), this species was introduced from the Philippines in 1925–1926 as a possible enemy of a sugarcane borer, *Rhabdocnemis obscura* (Boisduval). There are no Hawaiian specimens in the collections examined, and the species is also omitted from the recent checklist of Hawaiian terrestrial arthropods (Nishida 1992). Moreover, because *D. cycloides* is only known from Sumatra and Mentawai (cf. Knisch 1924), I very much doubt if this was actually the species introduced. Anyway, the species (whatever its identity) has apparently not become established, unless it is *Coelofletium exstriatum* (Orchymont), which is not impossible, because this species was described from the Philippines in 1925 as a *Dactylosternum*.

KEY TO HAWAIIAN SPECIES OF *Dactylosternum*

1. Serial punctures of elytra very fine, indistinct posteriorly, not at all forming striae (except sometimes for sutural stria posteriorly)..... 2
1. Serial punctures of elytra stronger, forming distinctly impressed striae, at least posteriorly 3

- 2(1). Head and pronotum red, elytra black, the latter without sutural stria *dytiscoides*
 2. Entire dorsal face black, elytra with fine sharp sutural stria posteriorly *dispar*
 3(1). Anterior margin of clypeus slightly but distinctly raised (strongest in male). Elytra with very fine microsculpture, particularly distinct posteriorly. Length 6–8 mm
 *hydrophiloides*
 3. Anterior margin of clypeus not at all raised. Elytra without distinct microsculpture. Length 3.2–5 mm 4
 4(3). Punctuation of head and pronotum consisting of fine and simple, circular punctures (Figure 18). Larger, moderately convex species, length 4–5 mm *abdominale*
 4. Punctuation of head and pronotum consisting of very small punctures each extended into a fine scratch on each side forming more or less the shape of a V (Figure 19). Smaller, more convex species, length 3.2–3.8 mm *subquadratum*

Dactylosternum dytiscoides (Fabricius)

Sphaeridium dytiscoides Fabricius, 1775: 67
 (type locality: St. Helena).

Dactylosternum dytiscoides: Swezey, 1931: 376.

MATERIAL EXAMINED: None (no Hawaiian specimens in the collections examined).

DIAGNOSIS: Length 5.5–7 mm. Head, pronotum, and ventral face red, elytra black; maxillary palpi, antennae, and legs reddish. Anterior margin of clypeus not raised, eyes very slightly emarginate anteriorly; head and pronotum with simple punctuation; elytra with very fine, but notably posteriorly distinct microsculpture, the serial punctures fine, obsolete posteriorly, not forming striae.

BIONOMICS: Terrestrial; in different kinds of decaying organic matter.

DISTRIBUTION: Hawaiian Islands? Oriental species, ranging from Sri Lanka to S.W. Pacific and Australia. The type locality was given as St. Helena by Fabricius (1775), but this is almost certainly erroneous (cf. Orchymont 1940).

DISCUSSION: Purposely introduced from the Philippines in 1925–1926, as a possible enemy of a sugar cane borer, *Rhabdoctenemus obscura* (Boisduval). Apparently not established.

Dactylosternum dispar (Sharp)

Cyclonotum dispar Sharp, 1882: 95 (type locality: Mexico, Guanajuato).

Dactylosternum dispar: Pemberton, 1945: 227, 233.

MATERIAL EXAMINED: NI'HAU: Ni'ihau, X.1945 (6, BPBM). KAUA'I: Kaua'i, 24.V.1944 (5, UH); Kekaha, mauka, 21.IX.1971 (1, UH); Kōloa, V.1944 (1, UH); Mākaha Val., IV.1956 (1, BPBM). O'AHU: Mānoa Val., III.1948 (1, BPBM); Punchbowl, Honolulu, 27.IX.1944 (2, UH); Wai'anae, I.1951 (1, BPBM); Wai'anae Mts, VI.1949 (4, BPBM). MAUI: Maui, T.H., 4.XI.1948 (1, UH).

DIAGNOSIS: Length 6–6.5 mm. Black, ventral face hardly paler; maxillary palpi and antennae yellowish red, the latter with darker club, legs piceous with slightly paler tarsi. Anterior margin of clypeus not raised, eyes moderately emarginate anteriorly; head and pronotum with simple punctuation; elytra without microsculpture, the serial punctures fine, obsolete posteriorly, not forming striae except for a fine sutural stria posteriorly.

BIONOMICS: Terrestrial; in decaying plant debris, perhaps mainly rotting cacti.

DISTRIBUTION: Widely distributed, but apparently rather local in the Hawaiian Islands (Ni'ihau*, Kaua'i, O'ahu, Moloka'i [cf. Nishida 1992], Maui*). A Central American species (Mexico).

DISCUSSION: Accidentally introduced from Central America; now established.

Dactylosternum hydrophiloides (MacLeay)
 Figures 5, 16

Sphaeridium hydrophiloides MacLeay, 1825: 36 (type locality: Java).

Dactylosternum hydrophiloides: Swezey, 1931: 376. Pemberton, 1941: 11.

MATERIAL EXAMINED: KAUA'I: lower Mōhihi, 3.III.1961 (1, UH). O'AHU: 'Āina Haina, Honolulu, 20.XII.1968 (1, UH); Honolulu, Nu'uānu, 30.V.1976 (1, BPBM); Honolulu, University of Hawai'i at Mānoa, 7.VI.1991 (7, MH); Honolulu, University of Hawai'i at Mānoa, 8.VI.1991 (12, MH); Honolulu, Woodlawn, 15.VI.1991 (10, MH); Kailua, Maunawili Val. (1, UH); Mānoa, U. H. campus, 18.IV.1986 (1, UH); Mānoa, 16.XI.1950 (2, UH); Pālolo, 2.V.1986 (2, UH); Pālolo Val., 18.IV.1986 (2, UH); Paradise Park, nr Mānoa Falls, 21.VI.1991 (7, MH); U. H. campus, 29.IV.1950 (1, UH). HAWAI'I: Hilo, XII.1972 (1, UH); Hilo, XII.1975 (2, UH); Puna Distr. nr Kapoho, 20.II.1972 (1, BPBM).

DIAGNOSIS: Length 6–8 mm. Black; ventral face reddish piceous; maxillary palpi and antennae yellowish red, legs piceous with slightly paler tarsi. Anterior margin of clypeus slightly, but distinctly raised (strongest in male), eyes moderately emarginate anteriorly; head and pronotum with simple punctation; elytra with very fine but notably posteriorly distinct microsculpture, the serial punctures forming striae apically.

BIONOMICS: Terrestrial; in various kinds of decaying organic matter. Hawaiian specimens have been found in decaying banana stems, papaya trunks, compost (garden refuse), and rotting skin, for example. Also collected at light.

DISTRIBUTION: Kaua'i, O'ahu*, Hawai'i. Oriental: India, SE Asia, Indonesia, and the Philippines.

DISCUSSION: Purposely introduced from the Philippines in 1925–1926, as a possible enemy of a sugarcane borer, *Rhabdocnemis obscura* (Boisduval). Now well established.

Dactylosternum abdominale (Fabricius)

Figures 18, 20

Sphaeridium abdominale: Fabricius, 1792:79. Sharp, 1879:83 (type locality: South America).

Cyclonotum abdominale: Blackburn & Sharp, 1885:218, 277.

Dactylosternum abdominale: Sharp, 1908:

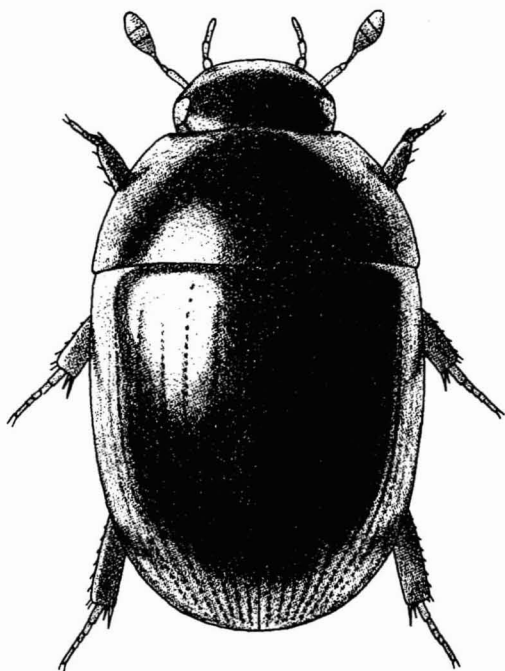


FIGURE 20. *Dactylosternum abdominale* (Fabricius).

579. Orchymont, 1937a:149, 150. Balfour-Browne, 1945:109, 116.

MATERIAL EXAMINED: O'AHU: Barbers Point, VIII.1950 (1, BPBM); Honolulu, 1912 (1, UH); Honolulu, 1913 (1, UH); Honolulu, 1916 (1, BPBM); Honolulu, 1924 (4, BPBM); Honolulu, 21.XII.1929 (2, BPBM); Honolulu, 1.VI.1940 (1, BPBM); Honolulu, 16.IV.1941 (1, BPBM); Honolulu, IX.1950 (1, UH); Honolulu, 22.IV.1958 (1, UH); Honolulu (10, BPBM); Honolulu, Nu'uānu, X.1976 (1, BPBM); Honolulu, University of Hawai'i at Mānoa, 8.VI.1991 (16, MH); Honolulu, University of Hawai'i at Mānoa, 7.VI.1991 (10, MH); John Rodgers Airport, I.1954 (1, BPBM); Kailua, X.1977 (1, UH); Kaimukī, 20.IX.1973 (1, UH); Kānehoa-Hāpapa Trail, 28.III.1973 (1, BPBM); Makiki, 28.III.1907 (1, BPBM); Mānoa (1, UH); Mānoa Val., 16.XII.1934 (1, BPBM); Mānoa Val., II.1949 (5, BPBM); Mānoa Val., IV.1959 (1, BPBM); Nu'uānu, 9.XII.1973 (1, UH); Nu'uānu Val., 1.IV.1948 (1, UH); O'ahu, VII.1958 (1, BPBM); Pearl City, 21.III.1930 (2, BPBM); Pearl City, II.1979 (1, UH); Poamoho,

1.III.1940 (3, UH); T.H., 23.IV.1912 (4, UH); U.H. Farm, 10.V.1951 (1, UH); Wahiawā, II.1954 (2, BPBM); Wai'anae, X.1950 (2, BPBM); Wai'anae Mts, VI.1952 (2, BPBM); Wai'anae Mts, Peacock Flat, 24.II.1970 (1, BPBM); Wai-kiki, 18.II.1932 (53, BPBM); Waimānalo, V.1960 (11, UH); Waipi'o, 24.IV.1929 (2, BPBM); windward O'ahu, 9.IX.1949 (1, BPBM). MOLOKA'I: Moloka'i Mts, 12.VI.1893 (1, BPBM). LĀNA'I: Lāna'i I., 30.VIII.1927 (1, BPBM). MAUI: Hai'kū, 6.XII.1927 (13, BPBM); 'Īao Val., 7.XII.1927 (3, BPBM); Kīpahulu Val., Palikea Stream (E. Maui), 4–6.VII.1980 (1, BPBM). HAWAI'I: Hilo, 22.VI.1922 (1, BPBM); Nāpō'opo'o, 5.VI.1922 (14, UH); Puna Distr. nr Kapoho, 30.5 m, 20.II.1972 (4, BPBM); T.H., 20.VI.1939 (2, UH).

DIAGNOSIS: Length 4–5 mm. Black; ventral face reddish piceous; maxillary palpi and antennae yellowish red, the latter with darker club, legs reddish piceous, tarsi usually slightly paler. Anterior margin of clypeus not raised, eyes very deeply emarginate anteriorly; head and pronotum with simple punctation; elytra without microsculpture, the serial punctures forming striae posteriorly.

BIONOMICS: Terrestrial; in all kinds of decaying organic matter. Hawaiian specimens have been found in decaying banana stems, papaya stumps, in compost (garden refuse), under cow dung, and on rotting skin, for example. Also collected at light.

DISTRIBUTION: O'ahu, Moloka'i*, Lāna'i, Maui, Hawai'i. Apparently of Neotropical origin. Now found throughout the Tropics and adjacent temperate zones from all major biogeographic regions.

DISCUSSION: Accidentally introduced (source of Hawaiian occurrence unknown); now well established.

Dactylosternum subquadratum (Fairmaire)
Figure 19

Cyclonotum subquadratum Fairmaire, 1849: 412. Sharp, 1879:83. Blackburn & Sharp, 1885:218, 277 (type locality: Tahiti).

Dactylosternum subquadratum: Sharp, 1908: 578. Orchymont, 1937a:149, 150. Balfour-Browne, 1945:109, 116.

MATERIAL EXAMINED: KAUA'I: Kīlauea, 15.IV.1909 (1, UH); Līhu'e, VII.1896 (1, BPBM); Wailua, XII.1956 (3, BPBM). O'AHU: Honolulu, T.H., 25.V.1925 (1, UH); Honolulu, Woodlawn, 8.VI.1991 (1, MH); Honolulu, Woodlawn, 15.VI.1991 (9, MH); Honolulu, Woodlawn, 21.VI.1991 (6, MH); John Rodgers Airport, I.1954 (1, BPBM); Kahana, 4.VII.1920 (5, UH); Kahana, 1.IX.1924 (1, UH); Kailua, 12.VII.1925 (1, UH); Mānoa (1, UH); Mānoa Val., IV.1949 (1, BPBM); Mānoa Val., 3.III.1969 (3, BPBM); Mt. Tantalus, V.1906 (2, BPBM); Niu Ridge, 4.VI.1932 (1, UH); Nu'uuanu Val. (1, BPBM); Pacific Hts., 5.XI.1930 (1, UH); Pālolo, 11.XII.1921 (1, UH); Pālolo Val., I.1954 (2, BPBM); Pauoa, 6.II.1917 (6, BPBM); S.E. Ko'olau Mts, 1917 (1, BPBM); Tantalus (1, UH); T.H., 4.II.1914 (3, BPBM); T.H., 7.XII.1939 (1, BPBM); T.H., Mt. Tantalus, 25.XI.1938 (1, UH); Waimano Trail, VIII.1955 (5, BPBM). MOLOKA'I: Wai'alua Ridge, 24.VII.1927 (6, BPBM). MAUI: Kīpahulu Val., Pua'alu'u Stream (E. Maui), 22.VII.1980 (1, BPBM). HAWAI'I: 'Ōla'a, III.1895 (1, BPBM); 'Ōla'a, IX.1896 (1, BPBM); 'Ōla'a, XI.1896 (2, BPBM); Puna Distr. nr Kapoho, 20.II.1972 (1, BPBM).

DIAGNOSIS: Length 3.2–3.8 mm. Black, ventral face hardly paler; maxillary palpi and antennae yellowish red, legs piceous with slightly paler tarsi. Anterior margin of clypeus not raised, eyes very deeply emarginate anteriorly; head and pronotum with punctation consisting of very small punctures each extended into a fine scratch on each side, forming more or less the shape of a V; elytra without microsculpture, the serial punctures forming striae posteriorly.

BIONOMICS: Terrestrial; in various kinds of decaying plant debris. Hawaiian specimens have been found in rotting banana stems, papaya trunks, and in compost (garden refuse), for example.

DISTRIBUTION: Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i. Indo-Pacific: Indonesia and the South Pacific to the Society Islands, Tubuai, and Mangareva.

DISCUSSION: Probably indigenous to the Hawaiian Islands.

Genus *Omicrus* Sharp

Omicrus Sharp, 1879:81. Type species: *Omicrus brevipes* Sharp (monotypy).

Very small (Hawaiian sp. 1.3–1.5 mm), broadly oval and strongly convex, almost semiglobular. Dorsal face glabrous. Labrum rather large and well sclerotized, not retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with distinct sutural stria posteriorly, otherwise (in Hawaiian sp.) only with few series of punctures laterally. Prosternum extremely short, middle portion rather strongly raised, but only moderately convex, not carinate, without well-defined antennal grooves. Mesosternum raised medially to a somewhat triangular, tectiform process. Metasternum with raised, somewhat convex middle portion, which projects anteriorly where it closely abuts mesosternal elevation. Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment hardly longer than second.

Omicrus brevipes Sharp

Figures 13, 17, 21

Omicrus brevipes Sharp, 1879:81. Blackburn & Sharp, 1885:218, 277. Sharp, 1908:579. Orchymont, 1937a:149, 150. Balfour-Browne, 1945:110, 117, 127 (type locality: U.S.A., Hawai'i, O'ahu).

MATERIAL EXAMINED: O'AHU: Honolulu, Woodlawn, 8.VI.1991 (1, MH); Honolulu, Woodlawn, 15.VI.1991 (28, MH); Honolulu, Woodlawn, 21.VI.1991 (1, MH); Mt. Tantalus, XII.1952 (4, BPBM).

DIAGNOSIS: Length 1.3–1.5 mm. Black, anterior portion of head, particularly labrum, paler reddish; ventral face reddish to piceous; maxillary palpi and antennae yellow, the latter with brownish club, legs yellowish red. Elytra with sharp sutural stria in a little more than posterior half and three regular series of punctures on lateral portions, otherwise without distinct striae or series of punctures.

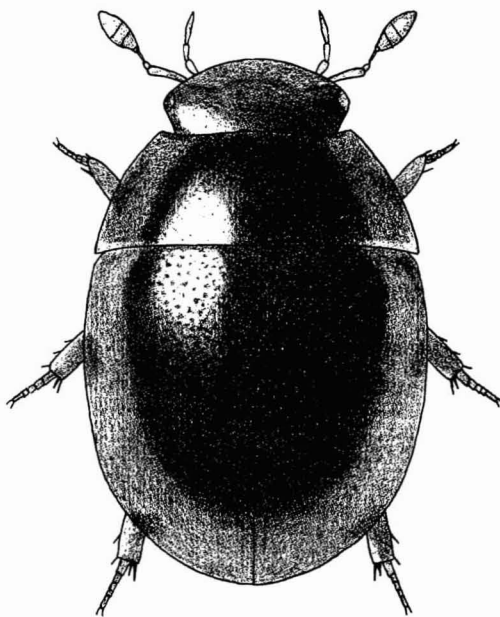


FIGURE 21. *Omicrus brevipes* Sharp.

BIONOMICS: Terrestrial; in different kinds of decomposing plant debris (e.g., wet decaying banana stems, rotten wood, and compost [garden refuse]).

DISTRIBUTION: O'ahu. Pacific: known only from O'ahu, Society Islands (Tahiti), and Tubuai.

DISCUSSION: Probably indigenous.

Genus *Noteropagus* Orchymont

Noteropagus Orchymont, 1919:132. Type species: *Noteropagus politus* Orchymont (orig. des.).

Very small (Hawaiian sp. 1.3–1.5 mm), broadly oval and rather strongly convex. Dorsal face glabrous. Labrum rather large and well sclerotized, not retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with 10 more or less developed series of punctures. Prosternum extremely short, middle portion rather strongly raised, carinate medially, with well-defined antennal grooves attaining lateral

prothoracic margin. Mesosternum raised medially to a flat transverse pentagonal tablet. Metasternum with slightly raised, somewhat convex middle portion, which projects anteriorly where it broadly abuts mesosternal elevation. Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment about as long as second.

**Noteropagus obliquus* Orchymont
Figure 12

Noteropagus obliquus Orchymont, 1925b: 305 (type locality: Malaysia, Pinang ["Penang"]).

MATERIAL EXAMINED: KAUA'I: Wai-pahe'e, 13.I.1944 (15, BPBM). O'AHU: Honolulu, Woodlawn, 3.VI.1991 (1, MH); Honolulu, Woodlawn, 8.VI.1991 (8, MH); Honolulu, Woodlawn, 15.VI.1991 (26, MH); Honolulu, University of Hawai'i at Mānoa, 8.VI.1991 (1, MH). HAWAI'I: Puna Distr. nr Kapoho, 30.5 m, 20.II.1972 (5, BPBM).

DIAGNOSIS: Length 1.3–1.5 mm. Reddish piceous; maxillary palpi and antennae yellow, club of the latter hardly darker, legs yellowish red. Elytra with 10 series of punctures abbreviated anteriorly, first series impressed apically to form short, rather shallow sutural stria, lateral series oblique, ending progressively farther to the anterior.

BIONOMICS: Terrestrial; in various kinds of decomposing plant debris (e.g., wet decaying banana stems, papaya trunks, and compost [garden refuse]).

DISTRIBUTION: Kaua'i, O'ahu, Hawai'i. Oriental: Malaysia and Solomon Islands.

DISCUSSION: Accidentally introduced (probably from SE Asia); now established. I have not seen the type, but the Hawaiian specimens agree with a specimen (coll. ZMUC) identified as *N. obliquus* by J. Balfour-Browne. The species is distinguished from other species of the genus by having the tibial groove at anterolateral corner of metasternum delimited posteriorly by a fine line (not divided by the line) in combination with

the distinctly punctate elevated middle portion of metasternum.

Genus *Cercyon* Leach

Cercyon Leach, 1817: 95. Type species: *Dermestes melanocephalus* Linnaeus (des.: Thomson 1859).

Small to rather small (Hawaiian spp. 2–4 mm), oval, moderately convex. Dorsal face glabrous (in Hawaiian spp.). Labrum relatively soft and pale, retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with 10 more or less developed striae or series of punctures, tenth stria more or less rudimentary, but usually detectable. Prosternum tectiform, carinate medially, with well-defined antennal grooves not attaining lateral prothoracic margin, middle portion not demarcated from antennal grooves. Mesosternum raised medially to an elongate oval flat tablet or a sharp longitudinal keel. Metasternum with slightly raised, slightly convex middle portion, which slightly projects anteriorly where it contacts mesosternal elevation in a single point (Hawaiian spp.). Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment much longer than second.

In addition to the two species listed below, I have seen two specimens (females) of an unidentified *Cercyon* species collected by F. X. Williams in Lulumahu Valley (O'ahu) in 1937 (UH). Undoubtedly, the species was accidentally introduced, and because these specimens are the only ones collected, the species has probably not become established in Hawai'i. As far as I can tell, the species is related to *C. lividulus* Orchymont from southern India, but is probably undescribed. The species is 2.5–3 mm long and is easily distinguished from the other two Hawaiian species by its color: entire dorsal face reddish brown, with vaguely defined darker markings forming a central spot on pronotum and a transverse crescent-shaped band across the elytra.

KEY TO HAWAIIAN SPECIES OF *Cercyon*

1. Smaller, 2.0–2.6 mm. Pronotum black with narrowly yellowish lateral margins, elytra yellow. Elevated portion of mesosternum forming a narrow but well-defined plate, ca. 5 times as long as wide *quisquilius*
1. Larger, 3.2–4.0 mm. Pronotum and elytra concolorous, pale brownish, usually lighter toward their margins. Elevated portion of mesosternum forming a sharp longitudinal ridge *laminatus*

Cercyon quisquilius (Linnaeus)

Scarabaeus quisquilius Linnaeus, 1761:138
(type locality: Sweden).

Cercyon quisquilius: Fullaway, 1921:607.
Orchymont, 1937a:149, 150. Balfour-Browne, 1945:110, 116.

MATERIAL EXAMINED. O'AHU: Honolulu, 14.IV.1952 (1, UH); Honolulu, 18.XII.1953 (1, UH); Honolulu, 16.IX.1957 (1, UH); Honolulu, 23.III.1959 (1, UH); Honolulu, 26.VIII.1960 (1, UH); Honolulu (1, UH); Kīpapa, XII.1953 (1, BPBM); Waimānalo, VI.1960 (9, UH). MAUI: Haleakalā, 3000 m, 19.I.1964 (1, BPBM).

DIAGNOSIS: Length 2–2.6 mm. Piceous to black, elytra and lateral margins of pronotum yellow; maxillary palpi and antennae yellowish red, club of the latter darker, maxillary palpi sometimes variably darker, legs yellowish red. Eyes moderate sized, moderately convex. Mesosternal elevation forming well-defined elongate tablet, about 5 times as long as wide.

BIONOMICS: Terrestrial; in various kinds of decaying organic matter, mainly in dung (e.g., fresh cow and horse dung) and decaying plant debris (e.g., compost heaps). Sometimes collected at light.

DISTRIBUTION: O'ahu, Maui*. Palearctic: throughout most of the region and introduced to North America and Australia.

DISCUSSION: Probably purposely introduced; now established. According to Swezey (1931) some "small hydrophilids" were introduced from Germany in 1910 and listed as "enemies of hornfly and other dipterous maggots that failed." Although *C. quisquilius* was first recorded from Hawai'i by Fullaway (1921), it is likely that it was one of those species, because this species is the only

"Hawaiian" hydrophilid that occurred in Germany at the time (except *Sphaeridium scarabaeoides* [Linnaeus], which is listed separately by Swezey). Today, *C. laminatus* also occurs in Germany, but this species is a much more recent element of the European fauna. Nishida (1992) gave records of *C. quisquilius* from Moloka'i and Hawai'i, but I have not seen any specimens from those islands in the collections examined. Probably, those records concern the following species, which was sometimes identified as "*C. quisquilius*" in the collections.

**Cercyon laminatus* Sharp

Cercyon laminatus Sharp, 1873:66 (type locality: Japan, Hyogo ["Hiogo"]).

MATERIAL EXAMINED: KAUA'I: Kīlauea, 7.XI.1919 (1, UH); Kīlauea, 23.VIII.1958 (1, BPBM); Wailua, XII.1956 (3, BPBM). O'AHU: 'Āhuimanu, 18.VI.1991 (1, MH); 'Aiea, III.1954 (2, BPBM); 'Ewa, 26.X–2.XI.1965 (3, UH); 'Ewa (3, UH); Honolulu, 4.V.1927 (1, BPBM); Honolulu, 31.III.1952 (1, UH); Kunia, 8.VIII.1936 (1, UH); Lulumahu Val., 18.IV.1937 (1, UH); Mānoa, 14.XI.1909 (3, UH); Mānoa Val., II.1949 (1, BPBM); Pālolo Val., III.1949 (1, BPBM); T.H., 17.III.1912 (1, UH); Tripler, 19.III.1949 (1, BPBM); University of Hawaii, Honolulu, 3.XII.1965 (2, UH); Wahiawā, II.1954 (1, BPBM); Wahiawā, VI.1958 (1, BPBM); Waipi'o, 25.IX.1956 (1, BPBM); Waipi'o, IX.1957 (3, BPBM). MOLOKA'I: Kainalu, 1500 ft, 19–22.VII.1927 (20, BPBM). MAUI: Wailuku, 7.XII.1922 (1, UH). HAWAII: Hilo, II.1975 (1, UH); Laupāhoehoe, 11.V.1911 (1, UH); Parker Ranch, X.1929 (1, BPBM); T.H., 25.XII.1911 (1, UH).

DIAGNOSIS: Length 3.2–4 mm. Brown or yellowish brown, head piceous to black, pronotal and elytral margins more or less paler,

usually also paler at elytral suture and base; ventral face piceous to black, with lateral prothoracic margins, middle portion of metasternum, and posterior margins of ventrites yellowish brown; maxillary palpi and antennae yellowish red, the latter with darker club, legs yellowish red. Eyes rather large and convex, almost globular. Mesosternal elevation forming a sharp longitudinal carina.

BIONOMICS: Terrestrial; in various kinds of decaying organic matter. Some Hawaiian specimens have been found in dung (e.g., cow dung) and decaying banana stems, but the species is most frequently collected at light.

DISTRIBUTION: Kaua'i, O'ahu, Moloka'i, Hawai'i. Palearctic (described from Japan); also introduced to Europe in recent decades.

DISCUSSION: Accidentally introduced, probably from Japan; now well established.

Genus *Paroosternum* Scott

Paroosternum Scott, 1913:220. Type species: *Paroosternum degayanum* Scott (orig. des.).

Very small (Hawaiian sp. 1.4–1.5 mm), oval, moderately convex. Dorsal face with fine and inconspicuous decumbent pubescence. Labrum relatively soft and pale, retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with nine punctate striae. Prosternum with abruptly raised middle portion that is deeply excised at the sides and (in Hawaiian sp.) carinate medially, antennal grooves well defined, not attaining lateral prothoracic margin. Mesosternum raised medially to an elongate oval flat or slightly concave tablet. Metasternum with raised and (in Hawaiian sp.) slightly convex middle portion (impressed medially in male), which projects a little anteriorly where it contacts mesosternal elevation in a single point (Hawaiian sp.). Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment much longer than second.

**Paroosternum horni* (Orchymont)

Figures 9, 11

Oosternum horni Orchymont, 1914:326 (type locality: Taiwan [Formosa: Taihorin + Tappani] and Hong Kong).

Paroosternum horni: Hansen, 1991:261.

MATERIAL EXAMINED: O'AHU: Honolulu, 25.VIII.1965 (1, MH); Mānoa, 21.V.1927 (1, UH); Wai'alae, 1914 (1, UH).

DIAGNOSIS: Length 1.4–1.5 mm. Yellowish red to reddish brown, head usually brownish; maxillary palpi, antennae, and legs yellow. Pronotum finely and rather sparsely punctate, with distinct transverse series of coarser and denser punctures along posterior margin. Elytral striae rather fine anteromedially, more impressed laterally and posteriorly, interstices convex but hardly costate. Mesosternal tablet about twice as long as wide.

BIONOMICS: Nothing has been published about the habits of this species, but it is almost certainly terrestrial and occurring in various kinds of decaying organic matter. The Hawaiian specimens were collected at light.

DISTRIBUTION: O'ahu. Oriental: India to Taiwan, reaching Japan. Afrotropical: Zaire.

DISCUSSION: Accidentally introduced (probably from SE Asia); probably established.

Genus *Oosternum* Sharp

Oosternum Sharp, 1882:112. Type species: *Oosternum costatum* Sharp (monotypy).

Very small (Hawaiian sp. 1.2–1.5 mm), oval, moderately convex. Dorsal face with fine but (in Hawaiian sp.) very distinct decumbent pubescence. Labrum relatively soft and pale, retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with nine punctate striae (in Hawaiian sp.). Prosternum tectiform, carinate medially, middle portion defined from the remainder by a pair of distinct ridges (Hawaiian sp.), antennal grooves well defined, not attaining lateral prothoracic margin. Mesosternum raised medially to an elongate oval flat tab-

let. Metasternum with raised and (in Hawaiian sp.) slightly convex middle portion, which projects a little anteriorly where it contacts mesosternal elevation in a single point (Hawaiian sp.). Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment somewhat longer than second.

**Oosternum costatum* Sharp

Figures 10, 22

Oosternum costatum Sharp, 1882:113 (type locality: Guatemala, Guatemala City).

MATERIAL EXAMINED: O'AHU: Honolulu, 1.IV.1930 (1, UH); Honolulu, 6.III.1958 (1, UH); Honolulu, 20.V.1963 (1, UH); Honolulu, University of Hawai'i at Mānoa, 7.VI.1991 (4, MH); Honolulu, Woodlawn, 15.VI.1991 (1, MH); Mānoa Val., 14.V.1928 (1, UH); Waimānalo, 19.V.1960 (1, UH); Waimānalo, 7.I.1972 (2, UH).

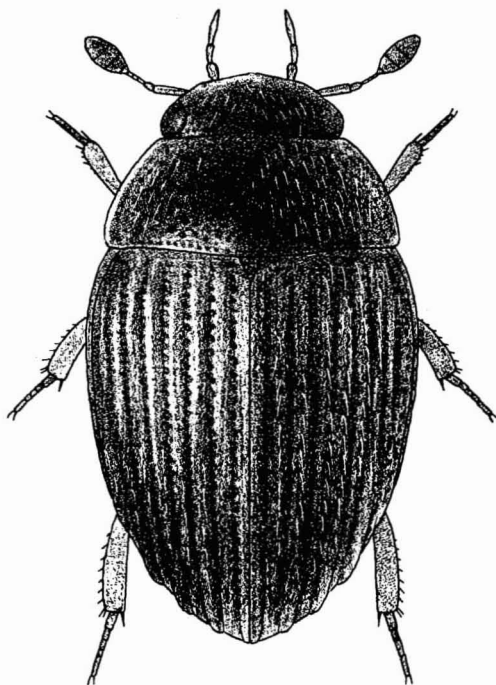


FIGURE 22. *Oosternum costatum* Sharp.

DIAGNOSIS: Length 1.2–1.5 mm. Reddish brown to dark brown, elytra slightly paler apically; maxillary palpi and antennae yellowish red, the latter with darker club, legs yellowish red. Pronotal punctation consisting of rather coarse punctures mixed with fine punctures and a transverse series of coarse and dense punctures along posterior margin. Elytral interstices rather convex, especially posteriorly; interstices 1, 3, 5, 7, and 9 more raised, costate. Mesosternal tablet about twice as long as wide.

BIONOMICS: Terrestrial; in various kinds of decaying organic matter, particularly decomposing plant debris. Hawaiian specimens have been collected in compost (garden refuse). In Central America it has also been reported from deposits of leaf-cutting ants (*Atta fervens* Say and *A. sexdens* L.).

DISTRIBUTION: O'ahu. Neotropical: Central and South America to the West Indies and North America. Accidentally introduced to the Azores, Ghana, Sri Lanka, and possibly India.

DISCUSSION: Accidentally introduced, probably from Central America or southern United States; now established.

Genus *Cryptopleurum* Mulsant

Cryptopleurum Mulsant, 1844:188. Type species: *Sphaeridium minutum* Fabricius (ICZN 1981).

Small (Hawaiian sp. 1.7–2.1 mm), broadly oval, moderately convex. Dorsal face with fine but distinct decumbent pubescence. Labrum relatively soft and pale, retracted under clypeus. Maxillary palpi rather short, apical segment slightly longer than penultimate, bending inward. Antennae nine-segmented, club compact. Elytra with 10 punctate striae (seventh and eighth stria closely aggregated in Hawaiian sp.). Prosternum abruptly raised medially to a large, flat, and noncarinate pentagonal tablet, antennal grooves well defined, attaining lateral prothoracic margin. Mesosternum raised medially to a large transverse pentagonal flat tablet. Metasternum

weakly and rather evenly convex, broadly contacting mesosternal elevation. Basal ventrite carinate medially. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment somewhat longer than second.

Cryptopleurum evansi Balfour-Browne

Cryptopleurum evansi Balfour-Browne, 1945: 128 (type locality: Fiji, Taveuni, Waiyevo).

Cryptopleurum minutum: Fullaway, 1921: 607. Orchymont, 1937a: 149, 151. Balfour-Browne, 1945: 110, 117 (nec Fabricius, 1775).

MATERIAL EXAMINED: KAUA'I: Kapa'a, 27.XII.1927 (1, UH); Wailua, XII.1956 (2, BPBM). O'AHU: 'Āina Haina, Honolulu, I.X. 1968 (7, UH); 'Ewa, IV.1958 (4, UH); Honolulu, V.1951 (1, UH); Honolulu, 10.VII.1958 (1, UH); Honolulu (1, UH); Honolulu, T.H., 1939 (2, BPBM); Honolulu, University of Hawai'i at Mānoa, 6.VI.1991 (3, MH); Honolulu, University of Hawai'i at Mānoa, 7.VI. 1991 (1, MH); Judd St., Honolulu, VIII.1952 (1, BPBM); Makiki, Honolulu, 29.XI.1936 (1, BPBM); Mānoa, 19.VI.1927 (3, UH); Mānoa, 31.X.1936 (6, BPBM); Mānoa Val., II.1949 (2, BPBM); Pālolo Val., III.1944 (2, BPBM); Paradise Park nr Mānoa Falls, 21.VI.1991 (5, MH); Wahiawā, IX.1953 (1, BPBM); Wahiawā, VI.1954 (1, BPBM); Wahiawā, IV.1955 (1, BPBM); Wahiawā, II.1956 (2, BPBM); Wahiawā, III.1969 (3, UH); Waikīkī, 3.XI.1949 (1, BPBM); Waimānalo, VI.1936 (1, UH); Waipi'o, IX.1957 (1, BPBM); Waipi'o, XII. 1960 (3, UH).

DIAGNOSIS: Length 1.7–2.1 mm. Reddish brown to black, apical third to half of elytra with yellowish to reddish marking that extends farther forward laterally and may even attain elytral base; maxillary palpi and antennae yellowish red, the latter with darker club, legs reddish. Head with dense microsculpture consisting of fine longitudinal lines; transverse (false) frontoclypeal groove complete. Pronotum with similar but more sparse microsculpture at least on lateral portions,

where it becomes gradually more reticulate. Elytral interstices convex, laterally and posteriorly subcostate, odd-numbered interstices slightly more raised, seventh and eighth striae closely aggregated, almost confluent.

BIONOMICS: Terrestrial; in different kinds of decaying organic matter. Hawaiian specimens have been found, for example, in cow dung and compost (garden refuse). Some-times collected at light.

DISTRIBUTION: Kaua'i, O'ahu. A Pacific species; so far only known from the Hawaiian Islands, Fiji, and Rapa Iti.

DISCUSSION: This species has been known in Hawai'i as *C. minutum* (Fabricius) and considered a European immigrant, but the Hawaiian specimens instead belong to *C. evansi*, described from the southern Pacific region. When the species was first recorded from Hawai'i (as "*minutum*"), Fullaway (1921) noted that its presence there had been known for a number of years and that it was not to be considered a newly arrived immigrant. Hence, it is possible that *C. evansi* is indigenous to Hawai'i.

Genus *Sphaeridium* Fabricius

Sphaeridium Fabricius, 1775: 66. Type species: *Dermestes scarabaeoides* Linnaeus (des.: Latreille 1810).

Moderate sized (Hawaiian sp. 5–7 mm), broadly oval, moderately convex. Dorsal face glabrous. Labrum well sclerotized, not retractable under clypeus. Maxillary palpi rather short, apical segment hardly as long as penultimate, bending inward. Antennae eight-segmented, club compact. Elytra with sutural stria in posterior half, otherwise without striae or series of punctures (Hawaiian sp.). Prosternum somewhat bulging medially, without antennal grooves. Mesosternum raised medially to a longitudinal, almost tectiform bulge. Metasternum with somewhat raised middle portion. Basal ventrite not carinate. Middle and posterior femora without hydrofuge pubescence. Middle and posterior tarsi without swimming hairs, their first segment much longer than second.

Sphaeridium scarabaeoides (Linnaeus)

Figure 23

Dermestes scarabaeoides Linnaeus, 1758:356
(type locality: Europe).

Sphaeridium scarabaeoides: Swezey, 1931:
375. Fullaway, 1938:21.

MATERIAL EXAMINED: KAUA'I: T.H., Kapa'a Homesteads, 12.XII.1940 (7, UH); Wailua, 12.XII.1940 (2, UH). O'AHU: Barbers Point, IV.1949 (1, BPBM); Barbers Point, VI.1949 (2, BPBM); Barbers Point, V.1950 (1, BPBM); Fort St., 21.X.1950 (1, UH); Honolulu, 12.III.1939 (1, BPBM); Honolulu, T.H., 1939 (1, BPBM); Kāne'ohe (1, UH); Kīpapa, XII.1953 (1, BPBM); Wai'anae, VI.1951 (1, BPBM); Waimea, 26.XII.1967 (1, BPBM). MOLOKA'I: Wailau, VI.1954 (1, BPBM). MAUI: Haleakalā Natl. Park (E. Maui) (1, BPBM); Kalapawili Ridge (E. Maui), 14.VI.1982 (1, BPBM); T.H., 31.VIII.1950 (1, UH); 'Ulupalakua, 5.III.1965 (3, UH).

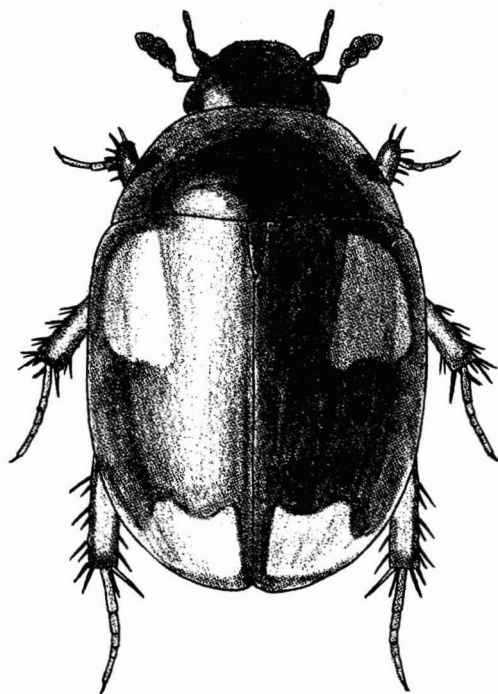


FIGURE 23. *Sphaeridium scarabaeoides* (Linnaeus)
(after V. Hansen).

DIAGNOSIS: Length 5–7 mm. Black, lateral margins of pronotum reddish yellow, sometimes only anteriorly, elytra with common, variable, but normally rather large yellowish apical spot divided (at least partly) by narrow dark sutural stripe and extending narrowly forward along elytral margins at least to middle, each elytron also with a large oblong, somewhat variable red or reddish subhumeral spot; maxillary palpi and antennae piceous to black, the latter often brownish basally, legs yellowish red, femora darkened in middle and along anterior margin, apex and outer and inner margins of tibiae normally narrowly darkened.

BIONOMICS: Terrestrial; in dung, typically fresh cow or horse dung; only rarely in other kinds of decaying organic matter.

DISTRIBUTION: Widely distributed in the Hawaiian Islands (Kaua'i*, O'ahu, Molo-ka'i*, Maui*, Hawai'i [cf. Nishida 1992]). A Palearctic species, widespread throughout the region and introduced to North America (including Mexico), where it has now become widely distributed; recently also recorded from tropical Africa (Zaire, probably introduced).

DISCUSSION: Purposely introduced from Germany in 1909, as a possible horn fly enemy; now well established.

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